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August 30, 1958

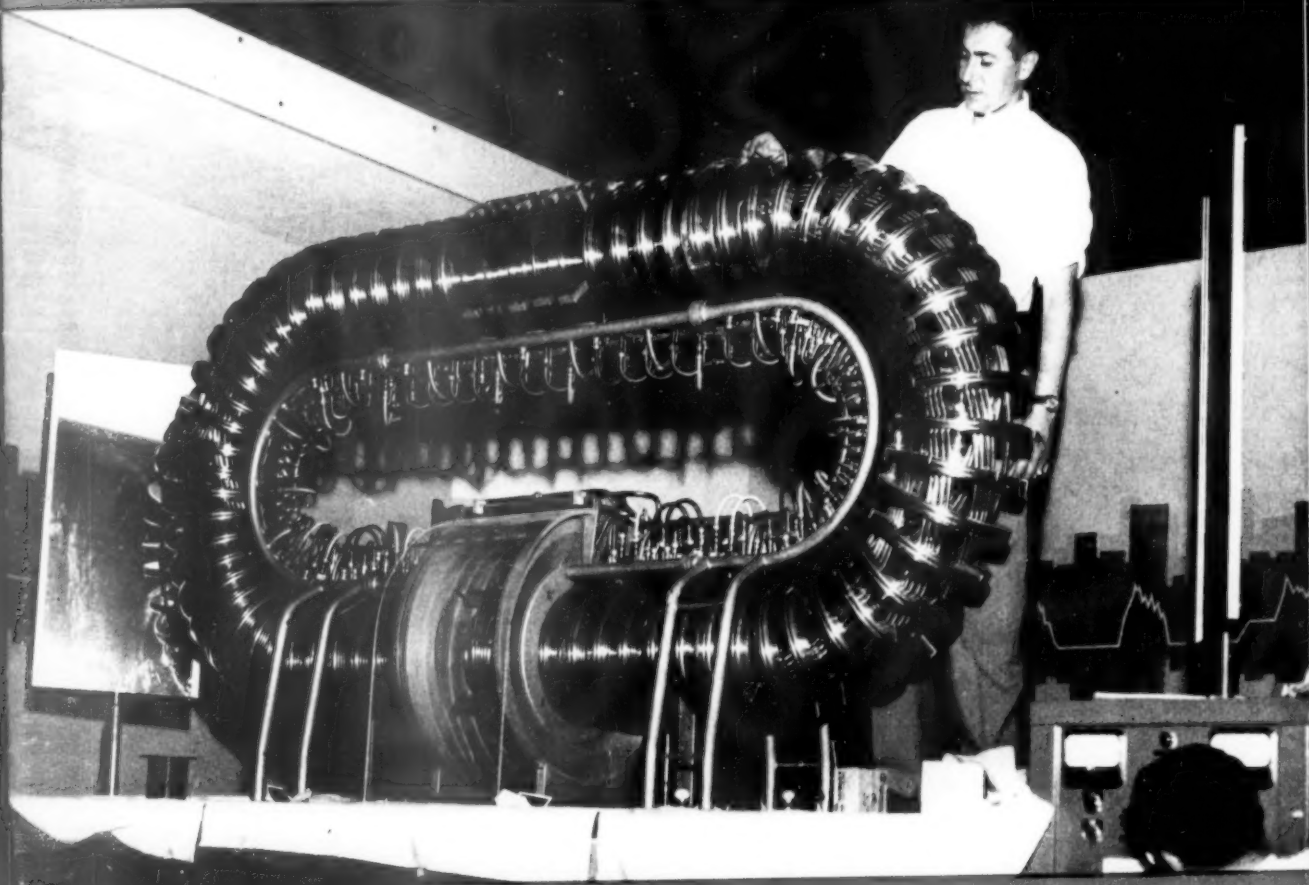
VOL. 74 NO. 9

PAGES 129-144

\$5.50 A YEAR

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Scientists' Show

See page 138

A SCIENCE SERVICE PUBLICATION

BIOCHEMISTRY

Explore Life Processes

Sea creatures are serving as experimental animals for scientists investigating the complex biochemical processes that underlie growth, aging and death.

► A BIOCHEMICAL blueprint of the developmental processes that underlie growth, aging and death is being drawn by a team of American scientists using purple pin cushions and tiny yellow stalks.

The purple pin cushions are sea urchins, orange-sized underwater animals that have served biologists well as unique guinea pigs. The tiny yellow stalks are tunicates, undersea creatures that in great numbers resemble seaweed and belong to that half-world somewhere between the invertebrates and vertebrates.

These two primitive creatures, from egg to adult, are presently being subjected to the most modern scientific research techniques in an attempt to explain their life processes. These are the same life processes that determine growth and development, aging and death in humans.

Sea urchins and tunicates are abundant in Bermuda's blue waters. Man's knowledge of how cells develop, change, mend, disappear and age is scarce. These factors have brought the scientific team to the Bermuda Biological Station, St. George's, Bermuda, where they are working under a grant from the U. S. Atomic Energy Commission.

The research is many-sided, but if there is a common denominator, it is cell development. Of particular interest to the scientists is how cells develop from a chemical point of view. They are trying to describe the chemical mechanisms and reactions that take place in the tiny factory known as the cell.

It may take years before the biochemistry of development is known. But once it is known it will be a major achievement that

could very well mean that scientists could control all life by directing a cell's growth.

Using the sea urchin, tunicate and other Bermuda fauna, Drs. Clement L. Markert and Ronald R. Cowden of Johns Hopkins University, Baltimore, Md., and Dr. Robert R. Kohn of Western Reserve University, Cleveland, Ohio, are concurrently attacking five specific problems:

1. To draw the blueprint of the cell's chemical factory, they are feeding the sea animals radioactive substances and then seeing how the animals use the substances. They are also trying to determine in what sequence enzymes and proteins are made during development, as well as the major metabolic steps that occur during all differentiation.

2. They are screening anti-cancer compounds such as 6-mercaptopurine and 8-azaguanine to determine their effect on the earlier stages of growth in sea animals. The compounds are being used to stop selectively vital life processes to determine which are essential for normal growth and development.

3. Using flatworms, the scientists are attempting to find evidence for the theory of wound-healing which holds that reserve cells rush from other parts of the body to mend an injury. Autoradiographic studies (radioactive snapshots) of flatworms shown in preliminary studies that cells from throughout the rest of a decapitated worm's body flock to the wound to regenerate a new head.

4. When man ages, certain cells disappear. As a tunicate develops, certain of its cells disappear. Studies are in progress to try to discover what happens to the tunicate cells.

These, in turn, might provide a clue to the degenerative process in man.

5. Congenital abnormalities in humans occur during embryological development. An oversupply of lithium, for example, has been shown to inhibit the growth of part of the central nervous system in various animals, resulting often in partial brain development. Lithium, therefore, is being introduced into the embryological development of Bermuda's sea creatures. It is hoped that the results of these experiments will give a clue to abnormal growth in human beings.

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ASTRONAUTICS

Explore Space Flight Using Jets of Light

► THE SCIENTISTS are looking toward flight beyond the moon, and even outside the solar system, among the stars.

At the Ninth Annual Congress of the International Astronautical Federation in Amsterdam, The Netherlands, Dr. Eugen Sanger of the Research Institute for Physics of Jet Propulsion, Stuttgart, said that jets of photons will compete with other systems of jet propulsion in travel in interstellar space when speeds exceed perhaps one million kilometers an hour (620,000 miles per hour).

Dr. Sanger suggested that gases of heavier chemical elements could be used as the source of radiation by being heated to some 150,000 degrees Kelvin (about 270,000 degrees Fahrenheit).

Several small rocket motors instead of one large one have an advantage when solid propellant power is used to produce large thrusts for a short time, engineer Jean A. Vandekerckhove of Brussels University told the Congress. This is a change from previous ideas that held that there was an advantage in bigness.

Dr. J. H. Huth of the Rand Corporation, Santa Monica, Calif., told the Astronautical Federation that the electrical power for earth satellites of limited life may be satisfactorily supplied by such devices as solar cells, provided micrometeorites and cosmic rays do not overrule this source.

For space vehicles that might use streams of ions for propulsion, much more electricity would be demanded and therefore Dr. Huth sees nuclear reactors as a better method of electrical generation than solar power. For standby and emergency power, fuel cells operating on hydrogen and oxygen gas would seem to be possible, with solar cells used to electrolyze water to furnish the two gaseous elements needed in the fuel cells.

The solid fuels for rockets that are most effective, said Dr. E. E. Buechner, chairman of the advisory committee of the German Society for Rocket Technology, are the equivalent of dynamite, gun cotton, nitroglycerin, and potassium and ammonium chlorates, all chemicals that are well-known for their explosive qualities. For liquid fuel rockets, highly concentrated nitric acid is found to be superior to liquid oxygen as an oxygen carrier.

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PURPLE PIN CUSHIONS—Drs. Ronald R. Cowden, Robert R. Kohn and Clement L. Markert (left to right) examine sea urchins in their Bermuda laboratory as part of a study of cell development.

SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

► **Energia Atomic.**—Esseva ponite in servicio le prime exemplar de un typo de reactor nucleari que es aerotransportabile e capace de un production de 3,000 kilowatts thermal. Illo es destinate a satisfacer le requirimentos de energia e calor in isolate e remote stationes militar. Su "combustibile" es un carga de uranium inrichite que debe esser reimplaciate non plus que un vice omne tres annos.

► **Psychiatria.**—Schizophrenia es un specie de "immaturitate chimic del systema nervose," secundo Dr. S. Bogoch del Universitate Harvard. Ille ha constatate que fluido cerebrospinal de schizophrenicos contine un anormalmente basse concentration del composito organo-chimic que es designate como acido neuraminic. In isto le schizophrenicos es comparabile a juveniles normal de minus que sette annos de etate. Le function cerebral del composito es incognoscite. Dr. Bogoch crede que illo ha a facer con le mantenentia del barriera sanguino-cerebral. Experimentos con le uso therapeutic del composito es in progressio.

► **Antibioticos.**—Le veneno de un nocivissime forma importate ab Mexico a in le Statos Unite (*Solenopsis geminata*) possede proprietates antibiotic non trovate in ulle altere veneno de insecto. Illo inhibi le crescentia de varie microorganismos; illo es toxic pro multe altere insectos; su possibile effectos cytostatic in tumores maligne es sub investigation al Universitate Louisiana.

► **Avicultura.**—Le periculo del propagation de psittacosis per parochettos es virtualmente eliminabile per le inclusion de tracias del antibiotico chlortetracycline in le dieta del aves. Granos cereal tractate con chlortetracycline ha jam apparite al mercato. Le aves los inglutit sin resistencia e beneficia in vitalitate e comportamento.

► **Agronomia.**—Le guerra inter Australia e su population de conilos ha entrate in un nove phase. Le morbo viral, myxomatosis, que pareva si promitteva alcun annos retro, comencia perder su efficacia. Nunc on utiliza le veneno fluoro-acetato de natrium. Illo es efficacissime, sed a causa del periculo que illo representa pro le bestial, su application debe esser regulate strictissime per le governamento.

► **Apicultura.**—Es reportate ab le Instituto pro Recercas Medical a Johannesburg in Sud-Africa que hypersensibilitate a piccaturas de ape pote esser combattite per injectiones intracutaneas de un filtrate extracto ab un pasta consistente del molite corpores de centenas de apes. Ex 47 individuos assi tractate, 4 reportava nulle melioration, 1 notava un leve melioration, 19 reguardava lor melioration como frappante, e 23 ha non ancora essite repicate.

► **Radiophonia.**—Esseva disveloppate per le armae statunitense in collaboration con RCA un nove typo de ascollator-casco que elimina quasi completamente omne disturbance per sonos extraneos (como illos de motores, explosiones, etc.). Le nove ascollator contine un microphono que responde al sonos extraneos per reproducer los in phase contrari, i.e. per amittir los.

► **Inventiones.**—Esseva patentate un bloco de vitro, pro le construction de mures in edificios domiciliari, que admittit le lumine exterior sed defecte lo verso le plafond. Illo contine prismas partialmente opacitate pro supprimer omne non-desirable deflexion in basso.

► **Vitaminologia.**—Duo scientistas del Universitate Calcutta ha studiate numerose amphibios, reptiles, aves, e mammiferos con respecto a

lor capacitate o incapacitate de synthetisar vitamina C (acido ascorbic). Le resultados del studio pare indicar que in le curso del ascension evolutionari le capacitate de synthetisar vitamina C passa ab le ren al hepate e postea se perde completamente. Illo non existe in le primates e non in le vesperilion fructivore de India (que es traditionalmente considerate como affinis al primates). Illo existe in le ren de amphibios e reptiles e de certe aves. In aves de evolution comparative recente illo non se trova in le ren sed in le hepate. In un specie de bulbules illo es absente.

► **Statistica Hospitalari.**—In 1957 (comparate con 1956), le hospitales statunitense serviva 22,993,000 patientes (+900,000). Nasceva in hospitales 3,739,259 infantes (+248,118). Le total medie del individuos hospitalisate a un momento particular esseva 1,320,000 patientes e 48,775 neonatos. Le summa medie disburse per le hospitales diurnamente pro omne patiente temporari esseva \$26,81 (+\$1,82). Le duration medie del hospitalisation del patiente individual esseva 7.4 dies (−0.1 dies). Le personal de servicio hospitalari esseva 107 pro omne 100 casos (+6). Trenta-sex pro cento del hospitales habeva minus que 50 lectos, 23% habeva inter 50 e 99 lectos, 27% habeva inter 100 e 299 lectos, e solmente 14% habeva plus que 300 lectos. Le numero total del hospitales in iste statistica es in le vicinitate de 7,000.

► **Aviation.**—Un specie de cordon umbilical pro helicopteros ha essite perfectionate per le Division Sikorsky del Corporation United Aircraft. Illo ha un longor de circa 20 m. Quando un helicoptero equipate con le cordon approcha le terra, le pilota abassa lo, e un membro del equipa de atterrage sasi lo e usa lo pro comandar le helicoptero sin ulle adjuva per le pilota. Le transmission del directivas se face integremente per medios electronic. Per relaxar le cordon o per tirar lo in basso o lateralmente on pote inducer le helicoptero a executar varie manovras de maniera multo plus precise e de typo multo plus complexe que es possibile pro le pilota qui non dispone de un favorable campo de vision immediate infra su machina. Le cordon-guida promitte devenir utilisime in le empleo de helicopteros in placiar palos in cavos prevemente excavate, in cargar e disargar camiones e altere vehiculos, in placiar prefabricate sectiones de turres e altere edificios in position, e in innumerable altere interpretas de natura similar.

► **Metallurgia.**—Le laboratorios del statunitense fortias aeree annuncia successo in le combination de metallos non combinabile in allegatos conventional in consequentia de lor grandemente differente temperaturas de fusion. Le nove methodo usa altissime energias in bombardar un metallo (per exemplo aluminium) con micrisime granos de un taltere (per exemplo iridium) e fortia assi le granos del secunde in le poros del prime. Le diametro del granos es minus que un centesimo de un millimetro.

► **Cosmogonia.**—Dr. T. P. Kohman, nunc del Instituto Max Planck pro Chimia a Mainz, opina que le typo e grado de radioactivitate constatate in certe specimens de tectite (mysteriose granos vitrose trovate in Bohemia, Est-India, Australia, etc.) es incompatible con le supposition que le tectites es de origine terrestre o mesmo de origine intra nostre systema solar. Secundo Dr. Kohman, illos debe venir ab altere regiones del universo.

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GENERAL SCIENCE

Reading Interlingua

► **YOU CAN READ** Interlingua if you had no more than one semester of high school French or Spanish or Latin and flunked it. You can read and understand a great deal of it even if you had never had contact with any foreign language.

Send this page to an acquaintance abroad and tell him that he can get additional information about Interlingua from Alexander Gode, SCIENCE SERVICE's Interlingua Division, 80 E. 11th St., New York 3, N. Y.

Financial contributions to the Interlingua program are needed.

Science News Letter, August 30, 1958

SCIENCE NEWS LETTER

VOL. 74

AUGUST 30, 1958

NO. 9

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N.W., Washington 6, D. C., NORR 7-2255. Cable Address: SCIENCE-SERV.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7 1/2 cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U.S.A. Entered as second class matter at the post office at Washington, D. C., under the act of March 3, 1897. Acceptance for mailing at the special rate of postage provided for by Sec. 34.40 P. L. and R., 1948 Edition, paragraph (d) (act of February 28, 1925; 39 U. S. Code 283) authorized February 28, 1950. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.



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PUBLIC HEALTH

No "Safe" Radiation Dose

Experiments with mice indicate that some radiation effects are long-lasting and that, insofar as future generations are concerned, there can be no safe radiation dose for man.

➤ THERE IS no period of safety after exposure to harmful radiation, a geneticist reports.

Radiation has been found to affect the primitive germ cell from which the sperm develops. Chromosome abnormalities may be transmitted to offspring in dangerous numbers for a long time after irradiation of the male.

This also is important evidence that there is no such thing as a "minimum permissible dose of radiation," says Dr. A. B. Griffen of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Me.

Until now many scientists had believed the effects of irradiation on the male sex organs were not long-lasting. Past experiments with mice seemed to indicate that after the supply of all the directly affected mature sperm had been exhausted, changes in chromosomes will not be passed on to the offspring.

A pilot study using mice indicates, however, that "for the mouse, and presumably for man, there is no period of safety after

irradiation" and visible, detectable breaks in chromosomes or aberrations, can be passed on to offspring, Dr. Griffen reports in the *Proceedings of the National Academy of Sciences* (July).

He points out that of 20 irradiated male mice studied for a period of six to 11 months, 18 produced a total of 706 offspring that lived through the testing period. Almost one-third of the offspring showing semisterility (26 of a total of 95) were born six months or more after the parent had been irradiated.

Semisterility means that one-half the offspring are dying before birth. Examination of the female will show evidence of the aborted fetus.

Apparently, the sperm carrying chromosome aberrations were produced from germ cells that had been irradiated in their very early and primitive stages, Dr. Griffen explains.

The damaged chromosome or chromosomes persisted through the development of the mature sperm. An earlier assumption

had been that irradiation of the primitive germ cells did not result in many aberrations in the sperm itself.

The chromosomes of "grandchildren" of one irradiated mouse show that a major chromosome change, a translocation, had occurred. Large pieces of chromosomes had switched places.

Further studies are underway, Dr. Griffen reports, to determine how long "translocations and perhaps other aberrations in dangerous number" may be transmitted after irradiation. Although the experiments are conducted with mice, it may be possible to estimate the effects of irradiation in man and his children.

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ASTRONAUTICS

Test Use of "Pinch Effect" To Make Mars Flight

➤ USE OF the "pinch effect" employed in experiments for controlling thermonuclear fusion to propel an unmanned vehicle on a one-way flight to Mars is being tested.

Alfred Kunen of Republic Aviation Corporation reported initial development of such an outer space engine to the western regional American Astronautical Society meeting at Stanford University. His interplanetary reconnaissance vessel would be equipped to photograph Mars from a height of 300 miles, then relay the pictures to earth.

Mr. Kunen said the engine would turn liquid oxygen into a plasma, the so-called fourth state of matter in which molecules are broken up into negative electrons and positive ions but the whole is nearly electrically neutral, although capable of conducting electricity. He said the magnetic pinch plasma engine would provide tremendous power for a comparatively small amount of fuel.

An electric current shot through the oxygen or other fuel starts the break-up of molecules, finally creating a cylindrical magnetic field surrounding the plasma. This magnetic cylinder pinches the plasma into a tiny area that is so designed the plasma shoots out the rear of the engine at very high velocities.

The electricity necessary to produce the magnetic pinch would come from a turbine generator that converted nuclear heat into electrical power.

Mr. Kunen suggests that the space ship would be accelerated through the earth's atmosphere into orbit with either conventional or nuclear rockets. Once in space, the plasma engine would propel the vehicle into interplanetary flight. A payload of 6,000 pounds could be sent on the unmanned trip if the take-off vehicle weighed 35,500 pounds.

Thermonuclear fusion experiments aim at fusing some of the basic particles of the pinched gas, Mr. Kunen noted. Comparisons between his space propulsion engine and thermonuclear experiments "cease" once the pinch has been effected. Mr. Kunen has designed the electrodes with disk shapes in order to direct the high velocity gases out through a nozzle.

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SPACE SHIP ENGINE—In a control room behind a protective glass wall Mr. Alfred Kunen (right) and associates at Republic Aviation Corp., Farmingdale, N. Y., run a test on the experimental apparatus of a "magnetic pinch plasma engine." In the high vacuum chamber (top, left), an electrical current, generated in the lower section, acts on a heavy gas and turns it into a plasma which is "pinched" and shot out of a nozzle outlet at very high velocities.

PSYCHOLOGY

Study Parental Behavior

A series of long-range studies of maternal attitudes and behavior point to the possibility of predicting a child's mental growth and development.

► **JOHNNY'S PERSONALITY** may be predictable before Johnny is born. One day, child psychologists may be able to spot a family situation where offspring will grow up to be juvenile delinquents.

These possibilities exist because mothers and mothers-to-be say and do things which permit psychologists to study their behavior and attitudes and relate them directly to a predictable picture of a potential son's or daughter's mental growth and development.

Research on child development involving a number of long-range studies is being undertaken by scientists at the National Institute of Mental Health. It is hoped that the studies will lead to a better understanding of childhood aberrations and abnormalities.

These studies are beginning to yield much information on the psychological development of the infant in relation to its family. One study, for example, indicates that higher intelligence scores during the first year of life are earned by babies whose mothers are dominating and punitive.

By the time school age is reached, however, the reverse is true. Children with high scores have mothers characterized as cooperative, positive, affectionate and more permissive.

Another study is attempting to organize a set of concepts that can be used to predict what a child's personality will be. It is based upon maternal attitudes and maternal behavior.

This personality prediction picture is drawn from studies of mothers and children and how they interact. Although still in the theory stage, the picture has been used already and the hope is that sometime in the future, a child's personality will be predictable long before it is born.

To arrive at a set of concepts that can be charted, the scientists have first watched countless mothers in their relationships with their husbands and children. These relationships are then broken down into four major groupings called autonomy, hostility, control and love. Within each grouping there are varying shades of a mother's reaction to her family and varying intensities.

To decide what constitutes hostility, for example, the scientists have found that irritability of the mother, rejection of the home-making role and inconsiderateness of the husband all fall comfortably into this category.

When applying these concepts to unmarried women or childless women, the psychologists use a personality pinwheel with each of the groupings set at a pole. Autonomy or freedom for the child is at the west; hostility or rejection is at the north; control or possessiveness is at the east and love or acceptance of the child is at the south.

By testing and watching a potential mother, the personality of her still unborn children can be plotted on the pinwheel. If she is found to be democratic, for example, this factor falls in between love and freedom. A dictatorial attitude is considered northeast, that is, almost midway between being hostile and possessive.

Ideally, a woman whose attitudes and behavior showed love and freedom on the personality pinwheel, could expect to bear and raise normal children. Love and control, on the other hand, might very well result in neurotic children, or children considered to be inhibited, submissive and obedient.

A combination of hate and freedom results in juvenile delinquents and a combination of hate and control could show up in the children in the form of schizophrenia.

The psychologists engaged in this study emphasize that it is a theory and because of the many factors involved, it is rare, indeed, when the ideal attitudes and behavior combine in a mother to result in any pat personality for her children.

In addition, the father's attitudes and behavior are involved, together with those of others. They all play a part in shaping the personality of children.

The scientists do point out, however, that maternal attitude and behavior cannot be ignored and the cumulative effect of a mother's relationship with her children goes far beyond the first year of a child's life.

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MEDICINE

Desert Rodents Transmit Disease to Man, Wild Life

► **SOME FLESH-EATING** members of the rodent family native to the Great Salt Lake Desert in Utah have been found to be propagators of tularemia.

This infectious disease is a problem for both man and wild life. Infected wild rabbits and hares, unless thoroughly cooked before eaten, can transmit the disease to man. The bite of a tick or fly, contaminated water or contact with body fluids of the infected animal can also cause the disease.

Harmless looking little rodents were found to be carrying the infectious organism, *Pasteurella tularensis*, after digesting the flesh of infected carcasses, E. Dean Vest and Nyven J. Marchette of the University of Utah report in *Science* (Aug. 15).

Most of the ground squirrels and chipmunks readily consumed infected carcasses that were provided. Some rodents ate only the anterior part and still others were reluctant to eat the dead flesh unless regular food supplies were withheld for 48 hours, the investigators say.

Every rodent that ingested infective flesh contracted tularemia; those that did not eat the flesh did not contract the disease.

Apparently, carnivorousism contributes to the spread and perpetuation of tularemia, a potent factor in the destruction of wild life populations.

Tularemia causes swelling of the lymph nodes in man. It also causes high fever and vomiting. There have been about 10,000 cases observed in man.

Those rodents that readily ate infective flesh included: northern grasshopper mouse, western harvest mouse, deer mouse, canyon mouse and pinyon mouse; antelope ground squirrel; and the least chipmunk. The chisel-toothed kangaroo, Ord kangaroo rat, desert wood rat, and the Great Basin pocket mouse did not readily eat the flesh.

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● RADIO

Saturday, Sept. 6, 1958, 1:30-1:45 p.m., EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Harold A. Edgerton, chief of the Science Youth Division, Science Service, Washington, D. C., will discuss "Science for Youth."

ASTRONOMY

Find Connection Between Solar Flares and Satellite

► **AN APPARENT** relationship between solar flares and changes in the rate of decrease of the rotation period of spunik II has been found by an Irish scientist.

Dr. T. Nonweiler of Queen's University, Belfast, has plotted the daily flare activity of the sun, then compared this to a plot of the observed rate of decrease of the second Soviet satellite's period from November, 1957, to April, 1958.

"The similarity of the two sets of fluctuations, even in some small details," he reports, suggests a correlation. Dr. Nonweiler urges further investigation to establish a reason for the dependence, in *Nature* (Aug. 16).

He says the relation is such that flares would have to be associated with a temporary decrease in air density and/or temperature within the lower ionosphere. To account for his diagrams, this reduction would have to happen on a worldwide scale, since the low point in the satellite's orbit ranged during its lifetime from middle to equatorial latitudes and through daylight and night zones.

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ENGINEERING

Net Stops Jet At Runway End

► **AN IMPROVED** barrier to halt runaway aircraft at the end of the runway has been shown at Andrews Air Force Base, Md. The device can safely stop a jet fighter and heavier aircraft. Carriage-like friction brakes operate along 200-foot tracks that flank the runway. A steel cable connects with a nylon net stretched across the path of the rolling jet, oversize brake shoes bring the system to a gentle halt.

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EVOLUTION

Seek Key to Evolution

➤ **MAN EVOLVED** from flatworm-like animals and not from jelly fish-like forms.

This theory of animal evolution, which differs markedly from that being taught at all levels of biology in the United States, is at the bottom of a study being carried on at the Bermuda Biological Station, St. George's, Bermuda, by Dr. Earl D. Hanson of Yale University, New Haven, Conn.

In a paper scheduled for publication in a scientific journal, Dr. Hanson sets forth his reasons for postulating a major change in our ideas of how man and the higher animals arose from one-celled creatures hundreds of millions of years ago.

This theory is not new. It was first suggested by the German scientist von Jhering in 1877, and gained some support, only to lose out again to the gastraea, or what we might call a jelly fish theory postulated by another German scientist, Haeckel. It is the Haeckelian theory of evolution that is currently predominant in the United States.

Recently, however, Prof. Jovan Hadzi of the University of Ljubljana, in Yugoslavia, has restated and expanded von Jhering's theory.

According to Haeckel and his followers, multicellular animals evolved from one-celled animals by colonization. More specifically, unicellular protozoa banded together and evolved colonial animals such as jelly fish, and some of these evolved

into flatworms and then on up the ladder to man.

Prof. Hadzi and Dr. Hanson, on the other hand, contend that during the forenoon of evolution one-celled animals became multicellular, not by banding together, but by individuals first becoming multi-nucleated and then evolving cell membranes around those nuclei. There is, as Dr. Hanson told SCIENCE SERVICE, strong evidence that one-celled animals evolved directly into flatworm-like creatures by this process. And the primitive flatworms, in turn, became the jelly fish's and man's progenitor.

Hence, the jelly fish, rather than playing the dominant role in evolution as Haeckel has assigned it, became only a dead-end experiment, an offshoot that went nowhere on the evolutionary stepladder.

Dr. Hanson is working with the primitive free-swimming flatworms known as the *Acoelous turbellaria*. He hopes to show that the flatworm has characteristics during its cell division that lie between those exhibited by one-celled animals and those of multicelled animals.

If Dr. Hanson finds what he is looking for, it will provide him with additional evidence to strengthen the theory that man evolved from an individual multinucleated cell and not from a colony of cells.

Dr. Hanson's work is being supported by a grant from the National Science Foundation.

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andre Ivanoff of the Museum National D'Histoire Naturelle, Paris, France, and Nils Jerlov of the Oceanografiska Institutet, Goteborg, Sweden, are trying to learn which fish or sea animal eyes are sensitive to polarized light; the distribution of polarized light and how it is affected by such things as turbidity; and the influence of these factors on undersea animal behavior.

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SOLENOID—The large solenoid used to provide a precisely known magnetic field about the proton sample is shown. Within the solenoid can be seen the coils that surround the sample and are used to measure the precession frequency.

BIOLOGY

Study Fish Navigation

➤ **SOME FISH**, like birds, migrate thousands of miles each year to lay their eggs and then return to the same ocean area they had migrated from. Even those fish that do not migrate seem to know exactly where they are going.

How these undersea creatures navigate as accurately as they do is one of the perplexing problems of science. If scientists can learn the secrets of fish navigation, it is conceivable that a similar system could be devised for man, the swimmer, and man, the submariner.

A biological and optical attack on this mystery is being made at the Bermuda Biological Station, St. George's, Bermuda, by an international team of scientists headed by Dr. Talbot H. Waterman of Yale University, New Haven, Conn.

Part of the attack is based upon what man knows about landlubbers. A wide variety of terrestrial animals and insects have been found to use the sun as a compass. Many also utilize the polarized light of the blue sky for their geographical direction signs. Most persons are capable of distinguishing polarized light only slightly with the naked eye. Human beings do not make

use of polarized light in nature, even though they may be able to tell direction from the sun, moon and stars. In large measure, man depends on man-made compasses responding to the earth's magnetic field.

The possibility exists, however, that fish and other sea animals resemble their landed kin and are similarly equipped with a polarized light compass that aids them in underwater navigation.

Potentially, Dr. Waterman explained, fish live in an environment that would seem to favor an underwater sea compass. Underwater light is from 60% to 70% polarized in very clear water such as is found in the Mediterranean or Sargasso seas. Nevertheless, it has yet to be demonstrated outside the laboratory that creatures of the deep have sun compasses or use the polarized light as navigational direction finders.

If and when a sun compass is found to be used by fish for navigation, Dr. Waterman pointed out, there will still be unexplained phenomena. What, for example, do fish use at night when there is no polarized light available or what do those in deep water do where sunlight never penetrates?

Currently, Dr. Waterman and Drs. Alex-

PHYSICS

Fundamental Constant Of Proton Redetermined

➤ **A FUNDAMENTAL** physical constant, the gyromagnetic ratio of the proton, has been redetermined very accurately by scientists at the National Bureau of Standards.

The new value for the proton magnetic moment means:

1. Important properties of the proton and electron, fundamental building blocks of matter, can now be known with greater precision. These properties are essential to a future understanding of atomic nuclei.

2. A convenient standard is available to industry for measuring magnetic fields in high-energy accelerators, servo mechanisms, electromagnets, etc., with greater precision than previously possible.

3. It is now possible to readjust the values of all other physical constants whose values depend on the measurement of magnetic fields, such as the electron charge-to-mass ratio, e/m , and Planck's constant, h .

The redetermination was made by P. L. Bender and R. L. Driscoll of the Bureau staff using facilities provided by the Fredericksburg Magnetic Observatory of the U. S. Coast and Geodetic Survey.

Science News Letter, August 30, 1958

MEDICINE

Tumor-Like Growth Spreads in Monkeys

► NEW EVIDENCE that tumors may be caused by a virus has come from Africa where an outbreak of tumor-like growths, resembling the spread of an infectious disease, has occurred among a group of experimental monkeys.

The outbreak occurred among caged Indian rhesus monkeys, W. G. C. Bearcroft and Margaret F. Jamieson of the virus research unit, West African Council for Medical Research, Yaba, Lagos, Nigeria, reported in *Nature* (July 19).

The scientists cautioned that they used the label "tumor" to describe the growths, without any implication that the tumors had been established as true neoplasms. Some of the animals were destroyed. Other recovered spontaneously, when the growth sloughed away and new fleshy masses grew over the affected areas.

Material from the growths has been examined by Dr. C. H. Andrewes, National Institute for Medical Research, Mill Hill, London. He has obtained evidence that the growth was caused by a virus, the scientists explain.

The first tumor growth was noticed on the right eyebrow of a rhesus monkey, June 15, 1957. During the following week the growth rapidly increased in size. Soon another monkey was found to possess a similar growth on the nose. During the ensuing weeks, the condition spread rapidly, and by the end of the year had affected approximately 20 animals. Animals of all ages were affected.

The rhesus monkey colony in which the outbreak occurred consisted of 35 animals housed in four pens placed adjacent to each other. Other types of monkeys were caged within limb reach of each other and of the rhesus monkeys. An unsuccessful attempt was made to limit the outbreak by separating tumor-bearing animals into individual cages.

The investigators successfully transmitted the disease to healthy rhesus monkeys and to two West African guenon monkeys. Attempts to transmit the condition to West African mangabeys, Patas monkeys and laboratory white mice failed, they say.

Science News Letter, August 30, 1958

MEDICINE

Radiation Slows Down Aging in Dogs

► AGING is a process that small doses of radiation may slow down, at least in dogs.

Dr. George W. Casarett, a radiation pathologist at the University of Rochester School of Medicine and Dentistry, described his life-extending work with dogs to the International Congress on Radiation Research meeting in Burlington, Vt.

He said very low levels of radiation in some cases seem to cause blood changes that enable the test animals to ward off microbial diseases more effectively. The white blood count in these cases rises, thus en-

hancing the body's natural defenses against disease.

Discussing his views at a press conference, Dr. Casarett described one experiment in which a dog received a huge, near-lethal dose of 400 roentgens and lived longer than non-irradiated control animals. He pointed out, however, that the control animals had a kidney disease that may have shortened their lives.

Dr. Casarett said he knows of no evidence that indicates the existence of a "built-in time clock" in humans or animals. He describes aging as "the pathological consequence of man to his environment." From a philosophical point of view, he said, man could be a potentially immortal animal.

In experiments on the aging of animals, he has been subjecting dogs to varying doses of radiation. Although his results are preliminary, he has found that aging in irradiated and non-irradiated dogs seems to be due to the same factors. Examination has shown that the size and number of the capillaries and arterioles are reduced in both groups.

Dr. Casarett is also working with the effects of radiation on the fertility of animals. Experimenting on the same male dogs for the past seven years, he has found that small doses do not affect the reproductive capacity. But some medium doses, about three roentgens a week in regular amounts, drastically depress the production of sperm.

Science News Letter, August 30, 1958

NUTRITION

Miniature Pigs Will Eat Fish Diet for Research

► MINIATURE PIGS are being fed fish oil fatty acids to determine the relationship of fish oil in the diet to cholesterol deposits in the circulatory system of the body, the Department of Interior has reported.

The little pigs, which weigh only 20 pounds when fully grown, will ultimately be killed. Their arteries will be examined to evaluate the effects of the fish diet.

Studies already completed under the Saltonstall-Kennedy Act for the improvement of domestic commercial fisheries have shown fish oils contain a greater amount and a greater diversity of these unsaturated fatty acids than do many other food fats. The current investigations are also being made under the Saltonstall-Kennedy program.

Another test will be made on rats to determine which of the many fish oil fatty acids are essential to physiological welfare. One object is attempting to determine the relationship of fish oils to metabolism and fat transport in the body, while still another is probing the properties of fish oil that may have pharmaceutical applications.

The nutritive qualities of fish in reference to heart disease and current related dietary research is explored in some detail in the *Commercial Fisheries Review* (July), published monthly by the Bureau of Commercial Fisheries.

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IN SCIENCE

ASTRONAUTICS

Interplanetary Dust Heavier Than Thought

► INTERPLANETARY dust that would bombard the skin of an earth satellite or space ship is much thicker than has previously been thought.

The dust blanket of meteor particles immediately above the earth's atmosphere may be as dense as 200,000 specks each cubic mile, Dr. David B. Beard of Lockheed Missile Systems Division and the University of California reported at the western regional American Astronautical Society meeting at Stanford University.

The dust could cause pitting and erosion to the outer skin of a space vehicle, raising the internal temperature and impairing its performance. The particles have a velocity of approximately seven miles a second, he said, so up to 20,000 will hit each square inch during a year.

However, the skin would probably not be punctured except from a hit by larger-sized particles, which occur much less frequently.

Dr. Beard's precise measurements of interplanetary dust are based on observations of the sun's very tenuous outer atmosphere and of the brightness of the night sky. The dust concentration, he reported, decreases with increasing distance from the sun.

The dust particles are concentrated in the plane of the space path taken by the earth and other planets around the sun, and also in the regions of the planets.

Science News Letter, August 30, 1958

PSYCHOLOGY

Influence May Be "Subliminal" Too

► PEOPLE who are worried by the thought that advertisers may influence their unconscious mind by hidden messages flashed momentarily on movie or television screens, should know that their subliminal influence on others is also a possibility.

Apparently each one of us is constantly attempting to influence the people around him by means of sounds and movements we are unconscious of making. And each one makes some unconscious use of the cues presented to him by the people around him.

This is reported in *The American Psychologist* (May) by Drs. James V. McConnell, Richard L. Cutler and Elton B. McNeil, University of Michigan psychologists.

As to whether a flashed message of which you are unaware can rouse you to go out and buy popcorn or drink beer, the case is not proved. People should remember, however, that "liminal" is a statistical term. It does not mean unconscious, but a stimulus value which gives a response half the time.

Science News Letter, August 30, 1958

ICE FIELDS

ICHTHYOLOGY

Shrimp Operate Paying "Fish-Cleaning" Business

► SOME SHRIMP have a booming business going, standing room only, in fish-cleaning.

They even find it pays to advertise.

The tiny blue-and-white shrimp, found in the Bahamas, lives on the parasitic copepods or sea lice that infest fishes. The shrimp sets up permanent shop on the head of a sea-anemone. Protected from predators by the anemone's stinging tentacles, it advertises its place of business by swaying from side to side and waving its exceptionally long white antennae. Fish that want a cleaning apparently recognize this activity as a sign to stop for a clean-up.

The shrimp cleans its fish customer meticulously from head to tail, including the fish's insides, cutting away dead tissue as well as removing parasites.

Conrad Limbaugh of the Scripps Institution of Oceanography at La Jolla, Calif., says that although there are other fish and shrimp that act as cleaners in the sea, this example of fish-cleaning is "by far the most complex one ever reported."

Permanent cleaning stations may be established on individual coral heads, reef formations, in sea floor depressions or in certain general areas, Mr. Limbaugh says. Many famous fishing grounds off the Pacific coast may be cleaning stations, he points out.

Fish collect regularly at the stations. Fish, particularly an injured or sick one, may visit more than one station or return many times during the day.

When fish cleaners were experimentally removed from a small area, Mr. Limbaugh reports, other fish of economic importance shortly disappeared. While the cleaners were gone, other fish examined had various fungus growths and other signs of ill health.

Specimens of the de-lousing shrimp, collected by Mr. Limbaugh, have been added to the marine invertebrate collections of the Smithsonian Institution.

Science News Letter, August 30, 1958

GEOPHYSICS

Suggest Earth's Magnetic Field Can Reverse

► REVERSAL of the earth's magnetic field may have changed the rate of production of carbon-14, the radioactive chemical used to date ancient archaeological material.

This is suggested by two University of Cambridge scientists in separate reports in *Nature* (Aug. 16). Dr. D. W. Allan, using the electronic computer EDSAC II, investigated mathematically the possibility that the earth's magnetic field could change its polarity. (A north-seeking compass would then point to the South Pole.)

He found reversal can occur under a wide

range of conditions. The theory is that the earth's molten rock core acts as a huge dynamo, generating electric currents and, therefore, magnetism. Although normal and reversed fields could exist with equal chance, it was not known whether a field could reverse.

Dr. Allan's analysis showed reversals can occur, although the time scale indicated by his mathematical models are still so much too short that he is continuing his studies. Such changes in the earth's magnetic field would affect radiocarbon dating.

Dr. C. Crowe has investigated carbon-14 activity of samples covering the past 5,000 years and found that errors in such dates during the last 3,000 years might well be consistent with an increase and then a decrease of earth's field. He calculated the difference between the actual age and the radiocarbon age of specimens in cases where both a radiocarbon date and a reasonably accurate historical or archaeological date are available.

Any difference, Dr. Crowe believes, shows that the carbon-14 production rate before death of the specimen was not the same then as it is now.

Dr. Crowe found that radiocarbon activity appears to follow a cycle, with a maximum change of about ten percent in the last 5,000 years. The changes in activity, he suggests, could be due either to one or to combinations of the following effects:

1. Variations in the intensity of the earth's magnetic field.
2. A cyclical variation in intensity as suggested by Dr. Allan and others.
3. Variations in vertical mixing of carbon-14 in the oceans.

4. Large changes in the intensities of the secondary cosmic ray neutrons and other secondary effects following large solar flares.

Science News Letter, August 30, 1958

PUBLIC HEALTH

Malaria Still Plagues Parts of World

► SOME 150,000,000 men, women and children still suffer from malaria, Dr. John Henderson, medical director of Johnson and Johnson Company, told the 12th general assembly of the World Medical Association meeting in Copenhagen, Denmark.

Malaria, fatal dysentery, trachoma and other infectious diseases still threaten some parts of the world, he said. Even though the "exotic" diseases are no longer exotic, we concern ourselves with the now major causes of death in the Western world, heart disease, cancer, arteriosclerosis and the aging process itself. However, in other quarters of the world, schistosomiasis is rampant, the tsetse fly continues to transmit its deadly disease, cholera can still occur in raging outbreaks, and any one of a hundred diseases that "aren't supposed to" can appear on our doorstep at any time.

"Our task—and one which is immensely difficult—is to clear and to still the waters, not by half measures of self-deception, but by mobilizing with all mankind to end hunger, poverty and disease," Dr. Henderson said.

Science News Letter, August 30, 1958

VIROLOGY

Safe Vaccine Developed for Newcastle Disease

► A SAFE, effective killed-virus vaccine has been developed to combat Newcastle disease in chickens.

Chickens can be protected throughout the broiler growing period, as long as 12 weeks, with a single injection, Dr. Eugene Gill of the U. S. Department of Agriculture's research service told scientists at the American Veterinary Medical Association meeting in Philadelphia. Ordinarily Newcastle disease has a high fatality rate in infested chicks, as well as causing reduced egg-laying in older chickens.

The new vaccine combines a high degree of immunity and safety. USDA scientists used one of the most potent strains of the Newcastle virus, in combination with various chemicals that inactivate the virus, making it safe, and that heighten the animal's immune response.

The use of killed vaccines offers the best possibility for the eventual eradication of Newcastle disease, USDA scientists believe.

A few cases of human infection with the virus have been reported. Symptoms may include headache, chills and inflamed eyes. While the illness is apparently not very serious in humans and will usually disappear without treatment, poultry raisers and veterinarians are warned to use care in handling infected birds.

Science News Letter, August 30, 1958

BACTERIOLOGY

Antibiotic Given Orally Helps Treat Ringworm

► AN ANTIBIOTIC has been found that can be successfully used to combat ringworm and other fungus infections of the skin.

The reason for the drug's success lies in the fact that it acts as a systemic antibiotic, affecting the infection from "within." In the past, surface applications of antibiotics have failed to control the ringworm because they could not penetrate the tough, horny layer of the keratin of skin, hair and nails to get at the fungus.

Guinea pigs experimentally infected with ringworm showed the beneficial effects of the drug, which is called griseofulvin, after only four treatments, Dr. J. C. Gentles of the University of Glasgow's department of bacteriology reports.

Griseofulvin, which is not very toxic to mammals, was effective against a number of kinds of ringworm, Dr. Gentles reports in *Nature* (Aug. 16).

It seems clear, he points out, that the uninfected part of the hair had been formed during treatment with the antibiotic and was resistant to invasion by the fungus.

Griseofulvin appears to have many of the characteristics of the "ideal antifungal drug" since its action persists, cells affected by the fungus continuing to resist it, and it can be administered in safe doses internally.

Science News Letter, August 30, 1958

GENERAL SCIENCE

Atoms for Peace

Numerous peaceful uses of atomic energy, ranging from blasting new harbors to cancer therapy, will be discussed at the United Nations conference to deal with the question.

By WATSON DAVIS

See Front Cover

► THE SECOND United Nations International Conference on the Peaceful Uses of Atomic Energy will last two weeks, beginning Sept. 1, in Geneva, Switzerland, with probably 5,000 in attendance, including delegates, scientists, press and observers.

It will be bigger than the first such meeting in 1955 with more than double the papers, double the governments and organizations participating.

The statisticians have figured out that some 2,400 papers from 65 governments and nine international agencies have been submitted. Only 600 papers will be actually presented to sessions. Even so, the flood of papers for delegates and press will amount to 550 tons of paper weight, since there will be abstracts, press releases, as well as copies of the communications given priority for presentation.

On most days there will be five sessions running at the same time. The conference goes on morning, afternoon and night, except for Sunday.

In the photograph on the cover of this week's SCIENCE NEWS LETTER Mitchell Thomas (left) and William M. Field (right) adjust the Stellerator which is part of the "Sherwood Project" area of the United States' demonstration of thermonuclear research.

World-Wide Organizations

Since the first conference, the atomic organizations have multiplied luxuriantly. The United Nations set up in Vienna the International Atomic Energy Agency, primarily to supply atomic fuels to countries that do not have uranium enrichment plants and to ensure that the fuels provided do not get diverted for making bombs to endanger the peace of the world. Then there is the European Nuclear Energy Agency set up by the Organization for European Economic Cooperation (OEEC) that works out joint development programs, international trade and security and standardization.

A treaty between Germany, France, Belgium, Italy, Luxembourg and the Netherlands results in Euratom for the development of atomic power. In this the United States and Britain cooperate.

A whole new category of science, engineering and technology has been created to serve the atomic world. There is an acute shortage of experts. As a result the United States particularly has engaged in international training programs of considerable extent.

Three years after the first Atoms for

Peace Geneva conference there are only two nuclear power plants of major size actually operating. But some 34 additional major-size power plants run by fissioning of atoms are under construction or planned, and several of them will be in use later this year or next.

The largest atomic power plant is at Calder Hall in Britain, with 92,000 kilowatt output, and the second largest is American at Shippingport, Pa., with 60,000 kilowatt output. In the United States seven other plants are operating, all small with one of them a 2,000 kilowatt packaged power reactor that can be moved from place to place if need arises. Soviet Russia has only the 5,000 kilowatt plant that started operating in 1954 and put the Russians ahead at the 1955 Atoms conference, but the first of five 70,000 kilowatt plants of various types is scheduled to be finished this year.

Under construction in the United States there are four large plants, with a total of 577,000 kilowatt output, and 12 major plants are in the planning stage. But Britain has 1,686,000 kilowatt capacity in seven plants building, one a duplicate of Calder Hall about to go to work.

By 1963 the United States will have atomic power plants generating 1,326,500 kilowatts of electric power, with two plants totalling 290,000 kilowatts due in 1960 and 379,400 kilowatts more in 1961.

France has two plants, totalling 150,000

kilowatts, building, and Canada one of 20,000 kilowatts. Italy and Japan are buying power stations from Britain. Belgium is obtaining one from the United States.

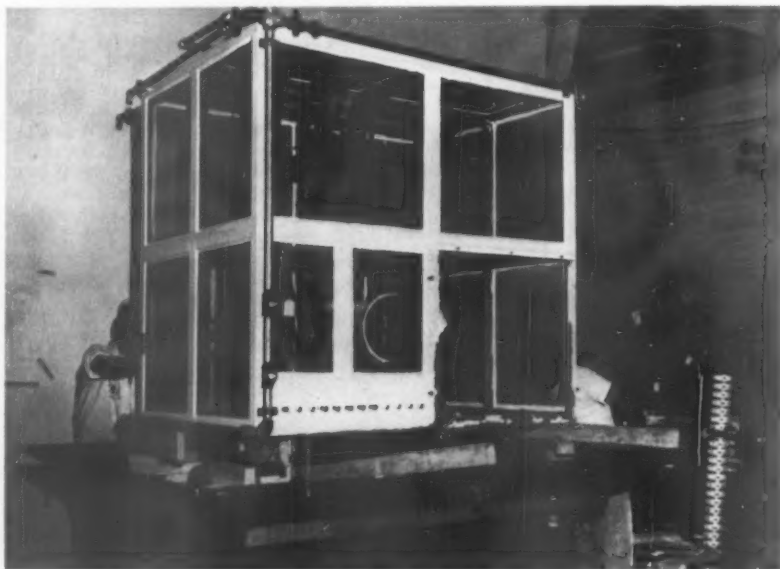
Sweden will describe at the conference "Adam," a 75,000 kilowatt reactor for house-heating.

At the first atomic conference in 1955 the operating "swimming pool" research reactor of low power installed by the United States was the hit of the exhibition. This year a similar U. S. reactor has been operating at the Brussels World Fair. In all, 26 research reactors have been or are being built in the United States for use in foreign locations. At this year's atomic conference there are two working fission reactors, a ten thermal kilowatt device that will be assembled before the eyes of the visitors and an isotope producing reactor called TRIGA.

Atomic Specialists Needed

A major effort at training atomic specialists has been made since 1955 by the United States at atomic centers. One of these, Argonne National Laboratory at Lemont, Ill., expects to have 70 of the 421 students at its international courses attend an "alumni reunion" at Geneva this year.

Atomic power has begun to conquer the seas. The United States has six nuclear-powered submarines operating, and two of them, the Nautilus and the Skate, made the northwest passage under the arctic ice. Two more nuclear submarines have been launched, 14 are being built, and a nuclear-powered guided missile cruiser and aircraft carrier are being built. The keel has been



ATOMIC GREENHOUSE—Workmen unload and adjust the "greenhouse" where the effects of radioisotopes on plant structures will be demonstrated.

laid for the first U. S. atomic merchant ship, the Savannah.

Russia has an atomic icebreaker about to operate, while Japan is designing an atomic submarine tanker.

In the air, no atomic powered aircraft have yet flown but the United States and Russia have reactors for such use under development and construction. Nuclear rocket propulsion is being investigated in the U. S. Atomic Energy project Rover, while project Pluto is determining the feasibility of applying heat from a reactor to ramjet engines.

Natural uranium is the simplest fuel for power reactors and this is being used by Britain's big plants, while the United States reactors use enriched uranium, that is, uranium containing more than the natural percentage of isotope 235. Only the U. S. and the U.S.S.R. have plants for enriching uranium.

Potential Power Fuel

Another fissionable fuel, plutonium isotope 239 made by the action of neutrons on the common natural uranium isotope 238, is a potential power fuel but so far it has been used only in bombs. The United States is studying for the future a big reactor that would produce large amounts of plutonium and 700,000 kilowatts of electric power. Still another atomic fuel, uranium fissionable isotope 233 made by similarly bombarding thorium with neutrons from reactors, is still farther from practical production and utilization.

Considerable improvement has been made in the material used in building atomic reactors, particularly the fuel elements that undergo intense radiation in the reactor cores. American research has shown that if uranium is alloyed with zirconium and molybdenum it will remain stable under irradiation. This advance is being exhibited at Geneva.

Thermonuclear Power Near

The possibility of the production of power by controlling and utilizing the reaction of the H-bomb, the thermonuclear power, was merely a dream at the time of the first Atoms for Peace conference in 1955. The president of that conference, Dr. Homi Bhabha of India, told how by extracting deuterium from seawater the world could have almost inexhaustible power for its future if H-bomb power can be controlled.

That control has not been achieved yet, although for a time last year it was thought that a sustained fusion reaction had been achieved in Britain. The scientists have not yet arrived at a stage in thermonuclear power equivalent to the famous Dec. 2, 1942, demonstration of the first self-sustaining fission reaction.

When Dr. Bhabha exploded his speculation that controlled fusion could come in 20 years, it was only surmised that the U. S., Britain and the U.S.S.R. were doing thermonuclear power research. As a matter of fact, American research was underway during World War II even before the fission bomb and fission power were achieved. The latest Atomic Energy Commission report

admits that secret research was formally inaugurated as early as 1951, but has been accelerated in the past few years.

British and Americans have jointly announced some of their results, while the Russians released some information even earlier. There is anticipatory speculation on what will be presented in controlled thermonuclear progress at the Geneva conference, especially by the Russians. There will be a total of some 15 hours of papers on controlled fusion. The United States is sending an extensive series of exhibits on its Project Sherwood, as the U. S. controlled fusion program is called.

To achieve power from thermonuclear reactions the heavy hydrogen must be brought to at least 100,000,000 degrees centigrade. So far only several million degrees have been achieved. Then the hot gas, or plasma as it is called, has to be held together for an appreciable length of time. This is very far from being achieved.

If this reaction were made self-sustaining and its energy harnessed, the world would have a source of energy that should last a billion years. The fuel, deuterium, could be extracted from the oceans at a cost of less than one percent of the cost of coal.

Although a major effort is being expended on H-power, the program for obtaining "conventional atomic" power from uranium is being developed consistently.

Being taken to Geneva for the U. S. exhibit are nine laboratory thermonuclear machines, which bear such labels as stellera-

tor, magnetic mirror, perhapsatron, plasma accelerator, triaxial pinch machine, etc. These are the devices that may bring a breakthrough in H-power in the future.

Isotopes: Useful Radiation

While spectacular explosions of atomic bombs or giant reactors for power attract more public attention, radioactive isotopes are more widely used throughout the world.

Isotopes, manufactured in atomic furnaces or in special reactors, are used as sources of radiation or as "tracers" in medicine, agriculture, industry and scientific research. The little explosions of atoms in the isotopes produce useful radiation or give notice of the isotopes in minute amounts.

Countries very far from production of atomic power are benefiting from the use of radioisotopes in the diagnosis and therapy of disease.

At the Geneva conference 17 countries will report on a single isotope application, the use of iodine 131 for detecting and treating thyroid disorders. Techniques for using that isotope, which has a tendency to seek out the thyroid gland and can be readily detected there, are described by Belgium, Brazil, China, France, Greece, India, Israel, Japan, the Philippines, Portugal, Romania, the U.S.S.R., the United Arab Republic, the United Kingdom, the United States, Uruguay and Venezuela.

In cancer therapy, several papers describe experimental use of the boron-neutron technique for localized treatment, particularly against brain tumors. In this application, boron, which tends to concentrate in tumor tissue, is injected and the tumor site is bombarded with a beam of neutrons from a reactor. The boron absorbs the neutrons and emits alpha radiation which is effective locally, destroying the tumorous cells with little damage to healthy tissue nearby.

Agriculture to Zoology

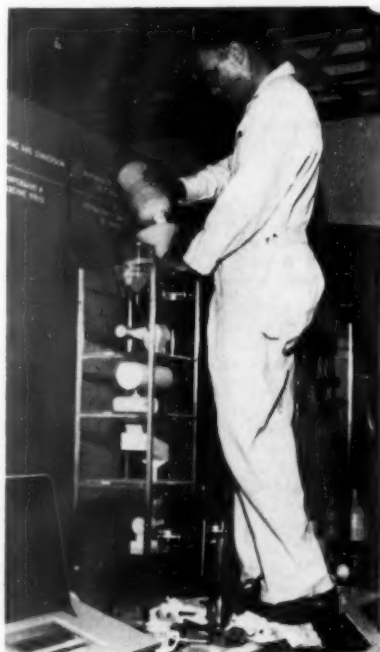
In the agricultural field, some 90 papers from a large number of countries cite use of radioisotopes as tracers in studies of fertilizer action, soil characteristics and livestock diseases; as sources of radiation for inducing mutations that may lead to better plant varieties and disease-resistant crops; and for preservation of food through sterilization.

In industrial applications, numerous papers indicate spreading adoption of techniques previously reported for using radioisotopes as measuring devices, in controlling assembly-line operations, and in changing the characteristics of certain materials.

A Soviet paper describes treatment of silkworm cocoons by radiation, and a Japanese study reports that isotopes can be used to detect fingerprints that would not show up in conventional tests.

A fully equipped radiochemical tracer laboratory is being exhibited by the U. S. Atomic Energy Commission at Geneva. It shows the radioactive labeling of two drugs, isoniazid with carbon-14, and diamox with sulfur 35. Isoniazid is a widely used drug for combating tuberculosis and diamox is

(Continued on p. 141)



URANIUM REFINING—Dr. John C. Breese of Oak Ridge National Laboratory, prepares a working scale model of a uranium refining apparatus. It is part of the fuel cycle demonstration being presented at the Second International Conference on the Peaceful Uses of Atomic Energy.

Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADVANCES IN CLINICAL CHEMISTRY, Vol. I—Harry Sobotka and C. S. Stewart, Eds.—*Academic*, 398 p., graphs, \$12. Readable accounts of selected important developments and their impact upon the progress of medical science. Each chapter has bibliography.

THE ANIMALS OF DOCTOR SCHWEITZER—Jean Fritz—*Coward McCann*, drawings by Douglas Howland, \$3. For young children, appealing sketches illustrating Dr. Schweitzer's relationship to his wild animal friends.

ARMY ENGINEERS: Fighters and Builders—C. B. Colby—*Coward-McCann*, 48 p., photographs, \$2. Shows what the U. S. Corps of Engineers is doing.

THE ART OF DRYING PLANTS AND FLOWERS—Mabel Squires—*Barrows*, 258 p., illus., \$4.50. While the stress is on artistic uses, the book also contains useful hints for the young botanist.

ATOMIC ENERGY COMMISSION TWENTY-FOURTH SEMI-ANNUAL REPORT—Lewis L. Strauss, Chairman—*Govt. Printing Office*, 410 p., illus., paper, \$1.25.

BABYLON AND THE OLD TESTAMENT—André Parrot—*Philosophical Lib.*, 166 p., illus., \$2.75. The story of Babylonian archaeology, revealing the region's history and civilization.

BIBLIOGRAPHY ON THE EFFECTS OF IONIZING RADIATIONS ON PLANTS, 1896-1955—Arnold H. Sparrow, John P. Binnington and Virginia Pond—*Brookhaven Nat. Lab. (Office of Technical*

Services), 222 p., paper, \$2.25. Lists of conferences, symposia, and references; subject index.

BRITISH MAMMALS—Mauice Burton—*Oxford Univ. Press*, 64 p., drawings by Jane Burton, and photographs, \$2.75. Unusually fine illustrations and simple text cannot help arousing beginner's interest in the study of animals.

THE CHINESE KNEW—Tillie S. Pine and Joseph Levine—*Whitelsey House*, 32 p., illus. by Ezra Jack Keats, \$2.50. Relates old Chinese know-how to simple experiments a child can do.

COOPERATIVE RESEARCH PROJECTS: Fiscal 1957—Romaine P. Mackie, Harold M. Williams and Alice Yeomans Scates, introd. by Herbert S. Conrad—*Govt. Printing Office for Office of Education*, 64 p., paper, 25¢. Concerns mostly education of the retarded child, but also research on identifying and developing unusual talent.

ANGER IN THE AIR—Oliver Stewart—*Philosophical Lib.*, 194 p., illus., \$6. Describes and analyzes air accidents, each one illustrating a particular kind of danger, and shows how engineers and research workers have learned from them.

DISCOVERING NATURE: An Introduction to the World Outside—Charlotte Orr Gantz—*Scribner*, 239 p., illus. by Charles Hargens, \$3.95. An amateur naturalist tells engagingly about the growth of her awareness of the "world outside."

ENCYCLOPAEDIA OF LIBRARIANSHIP—Thomas Landau, Ed.—*Hafner Pub. Co.*, 334 p., \$10. Comprehensive quick reference book covering all phases of librarianship.

EXPERIMENTAL BASIC ELECTRONICS—Rupert N. Evans and Charles B. Porter—*McKnight & McKnight*, 104 p., illus., \$3. Basic and advanced experiments acquainting the student with communications, control, measurement, and conversion of electricity to other forms.

THE FEDERAL BASIS FOR WEIGHTS AND MEASURES—Ralph W. Smith—*Govt. Printing Office*, NBS Circular 593, 23 p., illus., paper, 30¢. Historical review of Federal legislative effort, statutes and administrative action.

FIRST AID FOR YOUR INFANT AND CHILD—Eric Northrup, introd. by Morris Fishbein—*Holt*, 320 p., illus. by Dan Noonan, \$3.95. A practical book of advice for parents.

GAS CHROMATOGRAPHY: A Symposium Held Under the Auspices of the Analysis Instrumentation Division of the Instrument Society of America, August, 1957—Vincent J. Coates, Henry J. Noebels and Irving S. Fagerson, Eds.—*Academic*, 323 p., illus., \$10. Symposium aimed at maximum interchange of information and free discussion of advances in gas chromatography.

A GRAIN OF MUSTARD SEED—Alice Albertson Shurrocks with Ralph C. Bean—*Nantucket Maria Mitchell Assn.*, 245 p., illus., \$4.50. Contains descriptions of 200 representatives of 62 well-

known botanical families prevalent on the Island of Nantucket.

THE HELICOPTER—J. Shapiro—*Macmillan*, 269 p., illus., \$4.50. For the general reader, explains how the helicopter works, its history and mission.

AN INTRODUCTION TO THE STUDY OF EXPERIMENTAL MEDICINE—Claude Bernard, transl. by Henry Copley Green, foreword by I. Bernard Cohen, introd. by Lawrence J. Henderson—*Dover*, 226 p., paper, \$1.50. A 19th century French classic on physiology.

JET PROPULSION—Walter J. Hesse—*Pitman*, 567 p., illus., \$9.75. One- or two-semester course at the junior and senior engineering levels, or first-year graduate level.

LIFE HISTORY AND ECOLOGY OF THE CHIPMUNK, EUTAMIAS AMOENUS, IN EASTERN WASHINGTON—Harold E. Broadbent—*Mus. of Zoology, Univ. of Mich.*, 50 p., illus., paper, 95¢. Observations of two field seasons, live-trapping the little mammal.

THE MAN-MADE FIBRES INDUSTRY—R. Robson—*St. Martins*, 135 p., \$5. Gives an account of the development of this rapidly changing industry.

THE MANY FACES OF MONEY—Edith G. Neisser—*Human Relations Aids*, 29 p., illus. by Doug Anderson, paper, 25¢. What money means to different people at different times in their lives.

MEN AND WOMEN BEHIND THE ATOM—Sarah R. Riedman—*Abelard-Schuman*, 228 p., photographs, \$3. Biographies of the great names in nuclear physics told for young people.

MINERALS YEARBOOK 1955, Vol. II: Fuels—T. W. Hunter and others—*Govt. Printing Office for Bureau of Mines*, 440 p., \$2.25. Chapters on each mineral fuel, employment and injuries data, development in fuel industries, and review of energy production.

MODERN DRUG ENCYCLOPEDIA AND THERAPEUTIC INDEX—Edwin P. Jordan, Ed.—*Drug Publications*, 7th ed., 1516 p., \$17.50. Pharmaceuticals, biologicals and allergens. Manufacturers' and distributors' index.

OIL: From Prospect to Pipeline—Robert R. Wheeler and Maurine Whited—*Gulf Pub. Co.*, 115 p., illus., \$2.95. Describes technical operations in layman's language. Includes oil dictionary and abbreviations.

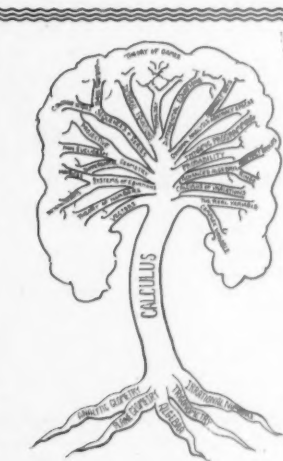
THE OLDER POPULATION OF THE UNITED STATES—Henry D. Sheldon, introd. and summary by Clark Tibbitts—*Wiley for Social Res. Council in coop. with Bureau of the Census*, 223 p., \$6. Monograph analyzes the process of aging in relation to employment, income and living arrangements, and discusses trends and problems.

OVERPOPULATION: Twentieth Century Nemesis—Alexander J. Stuart—*Exposition*, 240 p., graphs, \$4. Condensed study of procreation, from amoeba to modern man. Col. Stuart advocates birth control as a solution to overpopulation.

PETROLEUM SOURCEBOOK 1958—Curtis Stevens, Ed.—*Nat. Petroleum Bibliography*, 179 p., paper, \$6. A regional bibliography, covering petroleum developments in 82 nations.

PLASTICS IN BUILDING ILLUMINATION—Charles T. Granger and others—*Building Res. Inst.*, 99 p., illus., paper, \$3. A report of the Fifth Meeting of the BRI Plastics Study Group held in Houston, Texas, March 1958.

RECENT ADVANCES IN GELATIN AND GLUE RESEARCH: Proceedings of conference held at Cambridge University, 1957—G. Stainsby, Ed.—*Pergamon*, 277 p., illus., \$12. On the origin and structure of collagen, and on the compositions and properties of gelatins.



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SAFE DESIGN AND USE OF INDUSTRIAL BETA-RAY SOURCES—Subcommittee on Sealed Beta-Ray Sources of ASA Z54 Sectional Committee—*Govt. Printing Office*, NBS Handbook 66, 28 p., illus., paper, 20¢. Discusses aspects of personnel protection.

SAMARIA: The Capital of the Kingdom of Israel—André Parrot—*Philosophical Lib.*, 143 p., illus., \$2.75. Archaeology here reconstructs the stage on which the prophets Elijah and Elisha played their parts.

SPELEO DIGEST 1957—John R. Dunn and William B. White, Eds.—*Pittsburgh Grotto (Speleo Digest)*, 292 p., illus., paper, \$3. Collection of writings on the discovery of caves and new data on known ones.

THE STATISTICS OF METEORS IN THE EARTH'S ATMOSPHERE—Gerald S. Hawkins and Richard B. Southworth—*Govt. Printing Office* for Smithsonian, 16 p., paper, 50¢. Of interest to those concerned with the technical problems of the upper atmosphere.

THE STORY OF THE WINGED-S: An Autobiography—Igor I. Sikorsky—*Dodd*, 4th ed., 280 p., illus., \$4. With new chapter on recent, successful helicopter experiments.

TEXTBOOK OF ORGANIC CHEMISTRY—Lloyd N. Ferguson—*Van Nostrand*, 618 p., illus., \$7.50. For students of elementary organic chemistry, with study guides and references.

TOPOLOGICAL ANALYSIS—Gorden Thomas Whyburn—*Princeton Univ. Press*, 119 p., \$4. Centered around results obtainable with the aid of the circulation index of a mapping and properties resulting from openness of a mapping.

TRANSACTIONS OF THE CONFERENCE ON THE USE OF SOLAR ENERGY: The Scientific Basis, 5 vols.—Edwin F. Carpenter, Ed.—*Univ. of Ariz. Press*, 887 p., illus., paper, \$12.50 per set. On available energy measurement of the radiation, high temperature furnaces, solar heating, photochemical and electrical processes.

THE TRUE BOOK OF ROCKS AND MINERALS—Illa Podendorf—*Childrens Press*, 48 p., illus. by George Rhoads, \$2. A child's introduction to the world of rocks.

WONDERS OF THE HIVE—Sigmund A. Lavine—*Dodd*, 92 p., illus., \$2.95. About all types of bees—solitary, carpenter, mason, mining, social and stingless bees.

WOODLAND ECOLOGY—Ernest Neal—*Harvard Univ. Press*, 117 p., illus., \$1.75. For students and naturalists who wish to learn more about the lives and relationships of animals and plants.

THE WORLD OF CARBON—Isaac Asimov—*Abelev-Schuman*, 178 p., diagrams by author, \$2.75. Makes the carbon part of organic chemistry a story of absorbing interest to the general reader.

YOU AND THE EARTH BENEATH US—Julian May—*Childrens Press*, 63 p., illus. by Beth Wilson, \$2. Introducing the child to the earth's crust and the forces that made it.

Science News Letter, August 30, 1958

An antibiotic prepared from a commonly found skin organism is highly effective in protecting animals against lethal inoculations of *Clostridium septicum*, the organism that produces gas gangrene.

The earliest known copper-nickel alloy coins are those minted about 170 B.C. in Bactria, India.

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Atoms for Peace

(Continued from p. 139)

used in the treatment of cardiac attack, glaucoma and epilepsy. Radioautographs will be exhibited to show the effect of these drugs on the central nervous system and as a check on drug concentration that actually reaches various parts of the body.

A number of organic materials will be tagged with tritium, or radioactive hydrogen, isotope 3, by direct exposure to the gas. Since hydrogen is a constituent of most organic matter, almost any organic compound can be labeled with tritium to form an isotope with a relative high specific activity. The specific procedure for labeling with tritium will be demonstrated. Particularly interesting will be the tagging of adenine with tritium. A constituent of nucleic acids, which are contained in all cell nuclei, tagged adenine is becoming increasingly useful in the study of cell structure and activity.

The exhibit will also demonstrate the assaying of tritium and C-14 in various organic materials by a rapid and precise simplified technique.

A traveling isotope laboratory built as a self-powered bus will show Geneva atomic visitors how isotopes are handled and used. It is one of two mobile radioisotope laboratories that the United States is giving to the International Atomic Energy Agency in Vienna for giving radioisotope training courses at universities and research institutions throughout the world. Six students at a time can be given basic training in how to handle radioisotopes.

In the Los Alamos cryogenics exhibit, actual experiments with two kinds of isotopes of helium will be performed at 0.5 degrees

Kelvin, very near to absolute zero degrees Kelvin, which is equal to 459.72 degrees Fahrenheit below zero. The exhibit will show the spontaneous separation of helium-3 and helium-4 at extremely low temperatures. This was originally predicted by scientists of the Los Alamos Scientific Laboratory, observed at Duke University and first photographed by Russians. The two kinds of helium separate into layers. The bottom layer, rich in helium-4, is superfluid and can pass through extremely fine cracks that can not be penetrated by other gases or liquids.

How nuclear radiation can be used to perform atomic surgery will be shown at a University of Chicago exhibit. Pellets of radioactive yttrium-90 are injected by a needle through the nose and into the pituitary gland of a life-size model to simulate an actual operation, which is guided by electronic X-ray fluoroscopes.

An atomic farm will be operated by the U. S. Argonne National Laboratory, as a small completely sealed greenhouse in which plants are grown in a radioactive atmosphere. There will also be a "radioactive restaurant for rats," an automatic feeding device which delivers carbon-14 labeled foods at definite intervals to rats.

Moving Mountains

Conventional earth moving fades into insignificance beside the prospects of atomic excavation, the use of hydrogen bombs for hollowing out harbors, blasting through mountains to change the course of rivers and performing other feats of rearranging the contours of the earth.

One of the reports from the United States

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MISCELLANEOUS

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Questions

ASTRONAUTICS—How is the plasma "pinched" in the proposed magnetic pinch plasma engine? p. 133.

EVOLUTION—Who is credited with first proposing that higher animals evolved from flatworm-like animals? p. 135.

GEOPHYSICS—What is one possible way that the rate of carbon-14 production may have changed? p. 137.

MEDICINE—What are the symptoms of lupus? p. 131.

PUBLIC HEALTH—How many persons suffer from malaria? p. 137.

Photographs: Cover and pp. 138, 139, United States Information Agency; p. 131, Bermuda News Bureau-Gene Ray; p. 133, Republic Aviation Corp.; p. 135, National Bureau of Standards; p. 144, Ambulitter Corp.

Do You Know?

The copepods, crustaceans only a small fraction of an inch long, are so abundant in the ocean that the whalebone whale (which may be 100 feet long) feeds on them, straining them out of the water with its baleen-fringed mouth.

Tidal waves are caused by underwater earth tremors, tropical storms and other geophysical phenomena, and often cause enormous destruction.

The nuclear membrane of a cell has been described as a double-layered fenestrated envelope with raised ring-like structures surrounding "pore-like" areas.

As sweet corn matures, the sugar content of the kernel increases to a maximum level and then quite rapidly declines.

Anaerobic metabolism is the process whereby tissue can exist with a shortage of oxygen.

Lime is one of the oldest building materials.

to the conference tells of the studies made at the University of California Radiation Laboratory, Livermore, Calif., under the code name of Project Plowshare.

There are surveys already underway to create by a H-bomb explosion a new harbor to open the mineral riches of the arctic Alaskan coast to the outside world.

Hydrogen fusion bombs will be used for these engineering projects because they can be made relatively "clean" with a minimum of radioactive fallout.

Atomic Creations

In addition to carving the face of nature with a Gargantuan flourish, atomic explosives may in the future:

1. Create deep underground stores of energy in the form of heat that can be tapped and put to work.

2. Distill, by enormous heat, tar sands and oil shales in place in the earth layers so that the petroleum they contain can be extracted by pumping.

3. Break up low-grade ore deposits to allow them to be leached and their valuable minerals recovered more easily.

4. Form underground reservoirs for water by breaking up layers of impermeable ground by the H-explosions, allowing rains to penetrate and collect for future use.

5. Manufacture large quantities of radioactive isotopes by wrapping around the underground explosions materials to be transformed by the explosion's radiation, giving ample quantities not only for medicine, agriculture and industry, but the production of energy of commercial use.

The U. S. Atomic Energy Commission has already announced that it will detonate a small nuclear "device" underground in salt beds about 25 miles southeast from Carlsbad, N. Mex., next summer (1959). The explosion would be at the bottom of a 1,200-foot shaft drilled in the salt beds so that heat developed would be confined to a relatively small area.

Hope for Future

On Sept. 19, 1957, an underground test, coded Rainier, was fired 800 feet down in Nevada. This showed that underground atomic explosions would not contaminate ground water or produce other harmful effects on the area.

For such underground blasts, relatively small atomic explosions of the fission sort would be used. The forthcoming New Mexico test will use the equivalent of 10,000 tons of high explosives. For excavating and earth moving, larger explosions of the order of a million tons of TNT equivalent would be needed and they would be of the fusion type to keep radioactive contamination as low as possible.

There were reports a few years ago from Russia that atomic bombs were planned or used for blasting new river channels and other such purposes, but details were never revealed.

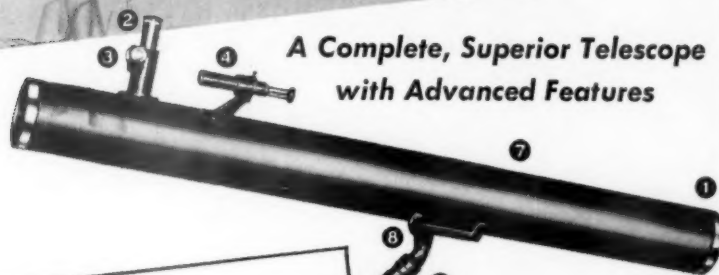
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✿ **FOLDING BOAT LADDER** is made of aluminum. The boarding ladder has non-skid steps and square hooks to fit gunnels up to nine inches in width. Support braces are adjustable to three positions and fold flat when not in use. Two-, three-, and four-step models are available.

Science News Letter, August 30, 1958

✿ **SURFACE SANDER** has a soft sponge pad on which the abrasive is mounted to provide powder puff-like action. The sander, which can be used with any one-quarter inch electric drill, also has a rubber universal joint for using the drill at almost any angle. A tacky disc surface permits changing the abrasives.

Science News Letter, August 30, 1958

✿ **FOAM-BACKED PLACE MATS** are described as providing quieter dining. The mats are seamed to fold flat to one-third of their 12-by-17-inch size for storage. Available in a wide variety of colors and designs, the mats are backed with a sound-deadening urethane foam.

Science News Letter, August 30, 1958

✿ **LITTER CARRIER** rolls along the ground on low-pressure pneumatic rollers.



It can be pulled by one man over most any terrain for rescue work. The litter, shown in the photograph, can be knocked-down for storage.

Science News Letter, August 30, 1958

✿ **SUN TAN TREE** is nine feet tall and has nine interchangeable metal leaves that can be turned to reflect the rays of the

sun. The leaves, which measure two and one-half feet long and 22 inches wide, are silver on one side and red, green, blue, pink, turquoise or gold on the other.

Science News Letter, August 30, 1958

✿ **PROTECTED FLASHLIGHT** has plastic fittings and an oversized head. The head and bottom fittings are molded of a high-density polyethylene plastic. The big globe-shaped head protects both the lens and the bulb.

Science News Letter, August 30, 1958

✿ **DEBRIS PICK-UP TOOL** will collect litter from grass, gravel, weeds and hard surfaces, as well as clean up after the dog. With scissor-like action, two steel scoops can be brought together. The tool is 33 inches long.

Science News Letter, August 30, 1958

✿ **CAMP AND PICNIC SETS** are designed to accommodate from one to six persons. The individual camp kit, for example, includes a pail with cover, fry pan, dish, all made of aluminum, and a heat-resistant plastic cup. All pieces nest together.

Science News Letter, August 30, 1958



Nature Ramblings



By BENITA TALL

► YOU MAY NOT be able to distinguish a Scotty from Sealyham, but the chances are good that you can tell the difference between a dachshund, the "hot-dog" dog, and a collie.

Actually the difference between the short-legged, long-bodied dachshund and collie is so extreme that it seems stretching the meaning of the word "dog" to call them both dogs. The shape of head, body, coat coloring, hair, tail, even the way each dog walks is different from the other breed.

Considering the immense variety in the world of dogs, you might think that the dog show judge or dog breeder would have an impossible job.

Within a breed, the dogs look much alike; some individuals will have a prettier or shinier coat or appear more alert, perhaps, but to the untrained eye the dogs are identical. When the judge seeks to choose the best dog from two different breeds, it seems he is faced with insurmountable difficulties. How does he make his choice?

He studies the dog beneath the skin.

Of course, the dog's coat and general looks count in the final determination, but



Dog Beneath the Skin

it is his conformation that determines if he is a prize-winner among dogs.

There is a very close relationship between a dog's physical structure, his stamina and capacity for carrying out the work assigned to the breed. Agreement with the standards set for the different kinds of dog is a yardstick for measuring the "sound animal."

Some of the most important elements of a dog's conformation are his head, spine, gait or kind of movement, and his scenting ability, sight and hearing senses. These are what the judge and dog breeder are most concerned with.

A ring of bone, the zygomatic arch, that

encloses the cavity in which the eyeball is fitted, is what determines the width of the head no matter what the breed is. The Pekinese or pug, with their short faces, have relatively wide arches with wide-set eyes. It is thus easier for a pug to look at an object in front of it with both eyes at one time than it is for a long-faced terrier.

The relation between the various portions of the dog's spinal column influences everything from the way his tail is carried—dipped as in the collie or up as with a terrier—to the way he moves and breathes. The long-backed dogs such as the dachshund must also have a long chest.

The judge is continually looking for the right qualities in a dog, one that moves well, is sound from front to back and has stamina.

Breeds vary extremely in their scenting ability, their vision and hearing. Deafness is associated with some white breeds; flat-nosed breeds have poorly developed scenting ability, and most dogs see double.

For each breed the judge must consider the work the dog was bred for and how well his senses and responses equip him for carrying out that work.

Science News Letter, August 30, 1958

